

REMARKS

I. Summary of the Examiner's Action

A. Claim Rejections

In paragraph 2 of the Office Action, the Examiner rejected claims 1 – 5, 8, 10 and 11 under 35 U.S.C. § 102(e) as being anticipated by United States Patent No. 6,389,000 to Jou (hereinafter “the Jou patent”).

In paragraph 12 of the Office Action, the Examiner rejected claims 9 and 12 under 35 U.S.C. § 103(a) as being unpatentable over the Jou patent.

This rejection is respectfully disagreed with, and traversed below.

B. Allowable Subject Matter

In paragraph 15 of the Office Action, the Examiner objected to claims 6, 7 and 13 as being dependent upon a rejected base claim, but indicated that they would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

II. Applicants' Response – Claim Rejections

A. Rejection of Claims 1 – 5, 8, 10 and 11 under 35 U.S.C. § 102(e)

Claim 1 recites (emphasis added):

1. A method for operating a communication system, comprising steps of:
defining the system as a combined Code Division Multiple Access CDMA and Frequency Division Multiple Access FDMA system; and
using a variable bandwidth waveform with multiple bonded transmitters and receivers that are each agile in both frequency and code to provide a variable bandwidth and variable rate multiple access system.

Applicants respectfully submit that it is not seen where the Jou patent either describes or suggests the emphasized subject matter of claim 1. A particular advantage of Applicants' invention as claimed is the use of "a variable bandwidth waveform with multiple bonded transmitters and receivers that are each agile in both frequency and code to provide a variable bandwidth and variable rate multiple access system." It is not seen where any appreciation for this mode of operation is either described or suggested in the Jou patent.

Rather, the Jou patent shows a relatively limited appreciation of channel bonding techniques; see, for example, Column 5, lines 45 – 49 and Column 8, line 66 – Column 9, line 11. Notably, the Jou patent nowhere describes what form its subject matter would take were it to be included in a system that practiced channel bundling.

In contrast to the Jou patent which merely makes mention of the prior art methods for channel bundling or bonding, Applicants' invention goes beyond these prior art methods:

"There are at least two important aspects of this invention. The first is the use of both CDMA and FDMA together to provide a improved concentration efficiency by making a larger pool of bandwidth available to each user. The second aspect enables channel bonding across both code space and frequency space, thus making the system capable of operating in a variable (not necessarily contiguous) bandwidth and at a finely variable rate.

* * *

As was stated above, channel bonding, namely transmitting and receiving on multiple links in parallel to achieve additional rates, is known in CDMA systems. If, however, each modulator 26 and demodulator 34 is both frequency and code agile, then both dimensions can be utilized to provide effective rate granularity. Thus, if a subscriber unit 10 has, for example, N modulators 26 and N demodulators 34, which are each capable of communications at rates that are power of two multiples of a basic rate on a variety of frequency subchannels, then a tremendous amount of flexibility is provided in achieving rates between those achievable by a single channel. If, for example, N equals seven, and each channel can achieve power of two multiples of 32 kbps from 32 kbps to 2.048 Mbps, then these bonded channels can achieve any integer (not just power of two integer) multiple of 32 kbps between 32 kbps and 4.096 Mbps. If one frequency subchannel is being heavily utilized by other traffic within the cell, then the BS 11 has the flexibility of reassigning some of the channels to other less-used frequency subchannels. Clearly the granularity of the variable rate effective channel is dramatically

improved by bonding channels in accordance with these teachings.”
[Application, Page 16, line 25 – page 17, line 32]

This mode of operation is neither described nor suggested by the Jou patent.

To repeat, as recited in claim 1, an aspect of Applicants' invention is “using a variable bandwidth waveform with multiple bonded transmitters and receivers that are each agile in both frequency and code to provide a variable bandwidth and variable rate multiple access system.” As set forth in the application

“Another advantage of adding frequency agility to a PN-code agile modulator 26 and demodulator 34 is that it permits the system to have flexibility in its consumed bandwidth. For example, a system that can operate only with 14 MHz wide channels cannot be used if the bandwidth allocated to the system is only 3.5 MHz. On the other hand, if a system uses CDMA/FDMA with channel bonding, then both the BS 11 and the SSs 10 have a bank of receivers that can each independently be tuned to one of a variety of frequencies, in addition to one of a variety of PN codes. If the bandwidth of any one subchannel is, for example 3.5 MHz, then by tuning some of the modulators and demodulators to each 3.5 MHz slot within a 14 MHz allocation, the bandwidth can be consumed efficiently. Thus a CDMA/FDMA system with four 3.5 MHz subchannels can operate in a 14 MHz, but a 14 MHz bandwidth CDMA system can not operate in a 3.5 MHz channel. Furthermore, even though a 10.5 Mhz bandwidth pure CDMA system and a CDMA/FDMA system with three 3.5 MHz subchannels occupy the same bandwidth and provide approximately the same throughput when fully loaded, the CDMA/FDMA hybrid system is far more flexible. For example, if a 14 MHz frequency allocation is

divided into four 3.5 MHz subchannels (labeled A, B, C and D) and subchannel C is allocated to another system, then a 10.5 MHz bandwidth pure CDMA system could not operate. In contrast, a CDMA/FDMA system could simply use subchannels A, B and D, leaving subchannel C to other systems. The ability to use non-contiguous subchannels provides operators a unique flexibility that can be very useful when attempting to add a new service to a band of frequency where some of the frequency subchannels have previously been allocated to other systems.”
[Application, Page 18, lines 7 – 29]

Again, the Jou patent shows no appreciation for such modes of operation.

For the foregoing reasons, Applicants respectfully request that the Examiner withdraw the rejection of claim 1. Applicants respectfully submit that independent claim 4 is patentable for similar reasons in addition to those associated with its unique aspects. Further, Applicants respectfully submit that dependent claims 2 – 3, 5, 8, 10 and 11 are allowable as depending from claims allowable dependent claims.

Applicants respectfully add the following remarks providing additional support for the patentability of the dependent claims.

Dependent claim 3 recites a method as set forth in claim 1 “where channel bonding across both code space and frequency space enables the system to operate in at least one of a variable, contiguous or non-contiguous bandwidth at a finely variable rate.”

It is not seen where in the portions of the Jou patent relied upon by the Examiner – Column 5, lines 35 – 42 and Column 6, lines 16 – 26 – there is either a description or suggestion of “channel bonding across both code space and frequency space.” If the Examiner disagrees, Applicants respectfully request the Examiner to point out with particularity where “channel bonding across both code space and frequency space” is either described or suggested in the relied-upon portion or anywhere else in the Jou patent.

Dependent claim 5 recites a CDMA and FDMA communication system as set forth in claim 4 “wherein there are N modulators and demodulators each operable for communicating at data rates that are a power of two multiples of a basic rate on a plurality of frequency channels within a channel.” Applicants have carefully reviewed the portions of the Jou patent relied upon by the Examiner and it is not seen where “data rates that are power of two multiples of a basic rate on a plurality of frequency channels with a channel” is either described or suggested. Applicants respectfully request that the Examiner point out with particularity precisely where this subject matter is either described or suggested in the relied-upon portions of the Jou patent.

B. Rejection of Claims 9 and 12 under 35 U.S.C. § 103(a)

Applicants note that claims 9 and 12 depend from independent claims that are patentable for the foregoing reasons. As a result, Applicants respectfully submit that claims 9 and 12 are similarly allowable.

Regarding the rejection of claim 12, Applicants respectfully note that the Examiner admits that the Jou does not disclose “the puncturing rate is made adaptive to mitigate fading conditions” as recited in claim 12. As a result, Applicants recite that it is the epitome of hindsight to reject claim 12 on this basis where the only appreciation shown for the advantages of making the puncturing rate adaptive to mitigate fading conditions appears in Applicants’ disclosure. For this reason, Applicants respectfully request that the Examiner withdraw the rejection of claim 12.

III. Conclusion

Applicants submit that in light of the foregoing amendments and remarks the application is now in condition for allowance. Applicants therefore respectfully request that the outstanding rejections be withdrawn and that the case be passed to issuance.

Respectfully submitted,

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Date

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